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0.6 — Installing an Integrated Development Environment (IDE)

👤 **ALEX**[1]   🕐 **APRIL 4, 2024**

An **Integrated Development Environment (IDE)** is a piece of software designed to make it easy to develop, build, and debug your programs.

A typical modern IDE will include:

- Some way to easily load and save your code files.
- A code editor that has programming-friendly features, such as line numbering, syntax highlighting, integrated help, name completion, and automatic source code formatting.
- A basic build system that will allow you to compile and link your program into an executable, and then run it.
- An integrated debugger to make it easier to find and fix software defects.
- Some way to install plugins so you can modify the IDE or add capabilities such as version control.

Some C++ IDEs will install and configure a C++ compiler and linker for you. Others will allow you to plug in a compiler and linker of your choice (installed separately).

And while you could do all of these things separately, it's much easier to just install an IDE and be able to do all of these things from a single interface.

So let's install one!

Choosing an IDE

The obvious next question is, "which one?". Many IDEs are free (in price), and you can install multiple IDEs if you wish to try more than one. We'll recommend a few of our favorites below.

If you have some other IDE in mind, that's fine too. The concepts we show you in these tutorials should generally work for any decent modern IDE. However, various IDEs use different names, layouts, key mappings, etc… so you may have to do a bit of searching in your IDE to find the equivalent functionality.

Tip

To get the most value out of this site, we recommend installing an IDE that comes with a compiler that supports at least C++17.

If you're restricted to using a compiler that only supports C++14 (due to educational or business constraints), many of the lessons and examples will still work. However, if you encounter a lesson that uses capabilities from C++17 (or newer) and you're using an older language compiler, you'll have to skip it or translate it to your version, which may or may not be easy.

You should not be using any compiler that does not support at least C++11 (which is typically considered the modern minimum spec for C++).

We recommend installing the newest version of a compiler. If you can't use the newest version, these are the absolute minimum compiler versions with C++17 support:

- GCC/G++ 7
- Clang++ 8
- Visual Studio 2017 15.7

Visual Studio (for Windows)

If you are developing on a Windows 10 or 11 machine, then we strongly recommend downloading Visual Studio 2022 Community (https://www.visualstudio.com/downloads/)[3].

Once you run the installer, you'll eventually come to a screen that asks you what workload you'd like to install. Choose *Desktop development with C++*. If you do not do this, then C++ capabilities will not be available.

The default options selected on the right side of the screen should be fine, but please ensure that the *Windows 11 SDK* (or *Windows 10 SDK* if that is the only one available) is selected. Windows 11 SDK apps can run on Windows 10.
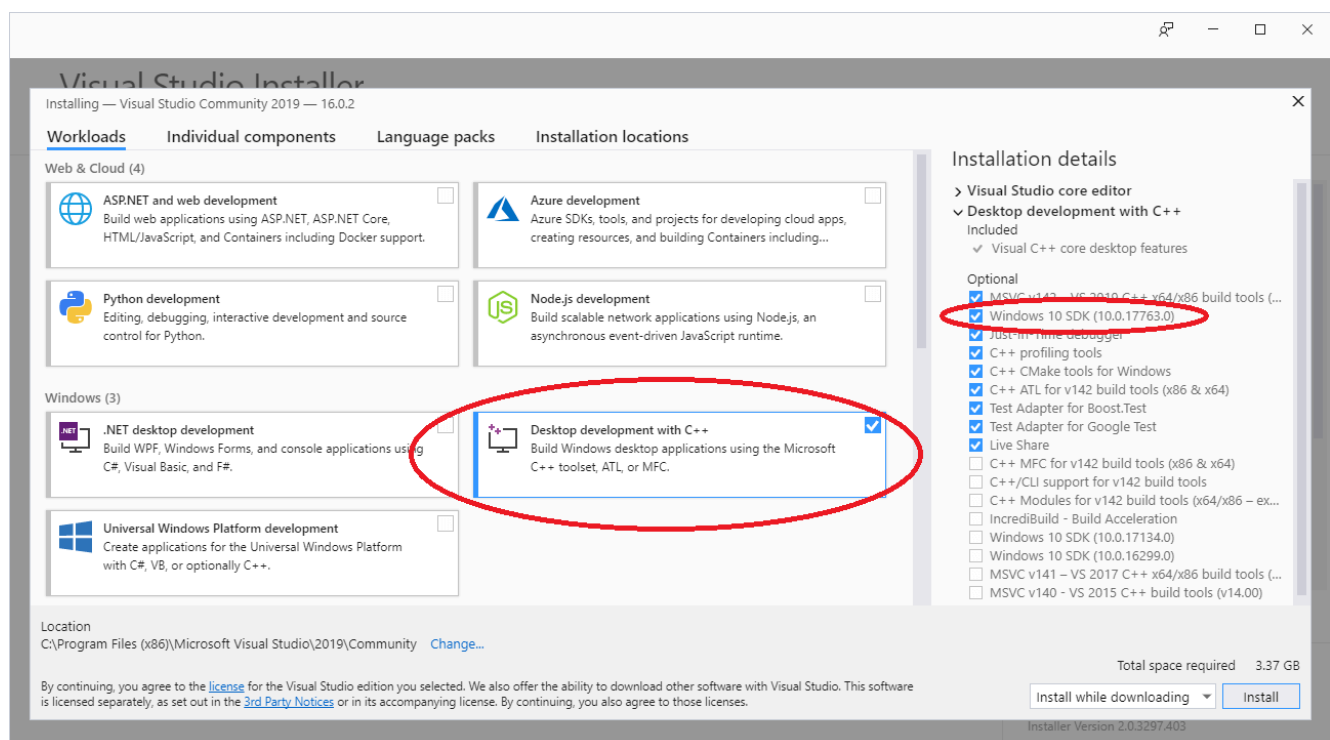
If disk space and/or download size are a challenge, then Microsoft still offers Visual Studio Express 2017 for Windows Desktop (https://visualstudio.microsoft.com/vs/express/)[4], which you can find towards the bottom of the page. Microsoft is no longer supporting this product and it doesn't

have many of the newer C++ language capabilities, so we only suggest it for users who can not install Visual Studio Community.

Code::Blocks (for Linux or Windows)

If you are developing on Linux (or you are developing on Windows but want to write programs that you can easily port to Linux), we recommend Code::Blocks (https://www.codeblocks.org/downloads/binaries/)[5]. Code::Blocks is a free, open source, cross-platform IDE that will run on both Linux and Windows.

For Windows users

Make sure to get the version of Code::Blocks that has MinGW bundled (it should be the one whose filename ends in *mingw-setup.exe*). This will install MinGW, which includes a Windows port of the GCC C++ compiler:

Windows XP / Vista / 7 / 8.x / 10:

File	Date	Download from
codeblocks-20.03-setup.exe	29 Mar 2020	FossHUB or Sourceforge.net
codeblocks-20.03-setup-nonadmin.exe	29 Mar 2020	FossHUB or Sourceforge.net
codeblocks-20.03-nosetup.zip	29 Mar 2020	FossHUB or Sourceforge.net
codeblocks-20.03mingw-setup.exe	29 Mar 2020	FossHUB or Sourceforge.net
codeblocks-20.03mingw-nosetup.zip	29 Mar 2020	FossHUB or Sourceforge.net
codeblocks-20.03-32bit-setup.exe	02 Apr 2020	FossHUB or Sourceforge.net
codeblocks-20.03-32bit-setup-nonadmin.exe	02 Apr 2020	FossHUB or Sourceforge.net
codeblocks-20.03-32bit-nosetup.zip	02 Apr 2020	FossHUB or Sourceforge.net
codeblocks-20.03mingw-32bit-setup.exe	02 Apr 2020	FossHUB or Sourceforge.net
codeblocks-20.03mingw-32bit-nosetup.zip	02 Apr 2020	FossHUB or Sourceforge.net

Code::Blocks 20.03 ships with an outdated version of MinGW that only supports C++17 (currently one version back from the latest version of C++). If you want to use the latest version of C++ (C++20), you will need to update MinGW. To do so, follow this procedure:

1. Install Code::Blocks as per the above.
2. Close Code::Blocks if it is open.
3. Open Windows File Explorer (Keyboard shortcut *Win-E*).
4. Navigate to your Code::Blocks install directory (probably C:\Program Files (x86)\CodeBlocks).
5. Rename the "MinGW" directory to "MinGW.bak" (in case something goes wrong).
6. Open a browser and navigate to https://winlibs.com/[6].
7. Download an updated version of MinGW-w64. You probably want the one under *Release Versions -> UCRT Runtime -> LATEST -> Win64 -> without LLVM/Clang/LLD/LLDB*

   -> *Zip archive*.
8. Extract the "mingw64" folder to your Code::blocks install directory.
9. Rename "mingw64" to "MinGW".

Once you have confirmed the updated compiler works, you can delete the old folder ("MinGW.bak").

For Linux users

Some Linux installations may be missing dependencies needed to run or compile programs with Code::Blocks.

Debian-based Linux users (such as those on Mint or Ubuntu) may need to install the *build-essential* package. To do so from the terminal command line, type: `sudo apt-get install build-essential`.

Arch Linux users may need to install the *base-devel* package.

Users on other Linux variants will need to determine what their equivalent package manager and packages are.

When you launch Code::Blocks for the first time, you may get a *Compilers auto-detection* dialog. If you do, make sure *GNU GCC Compiler* is set as the default compiler and then select the *OK* button.
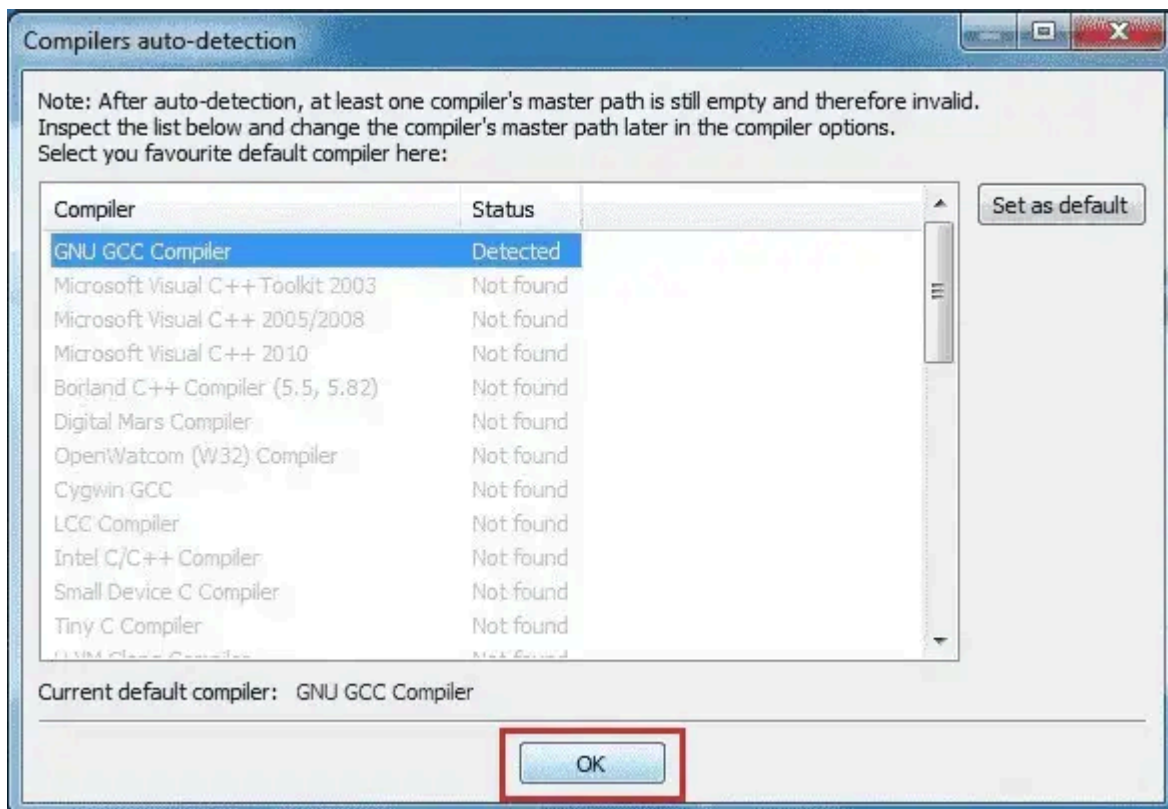
Q: What do I do if I get a "Can't find compiler executable in your configured search paths for GNU GCC Compiler" error?

Try the following:

1. If you're on Windows, make sure you've downloaded the version of Code::Blocks WITH MinGW. It's the one with "mingw" in the name.
2. Try going to settings, compiler, and choose "reset to defaults".
3. Try going to settings, compiler, toolchain executables tab, and make sure "Compiler's installation directory" is set to the MinGW directory (e.g. C:\Program Files (x86)\CodeBlocks\MinGW).
4. Try doing a full uninstall, then reinstall.
5. [Try a different compiler.](#)[7]

Visual Studio Code (for experienced Linux, macOS, or Windows users)

Visual Studio Code (also called "VS Code", not to be confused with the similarly named "Visual Studio Community") is a code editor that is a popular choice with experienced developers because it is fast, flexible, open source, works for multiple programming languages, and is available for many different platforms.

The downside is that VS Code is much harder to configure correctly than other choices on this list (and on Windows, harder to install as well). Before proceeding, we recommend reading through the installation and configuration documents linked below to ensure you understand and are comfortable with the steps involved.

Warning

This tutorial series does not have complete instructions for VS Code.

Readers have reported many different challenges getting Visual Studio Code installed and configured correctly for C++. We **strongly** do not recommend this option unless you are already familiar with Visual Studio Code, or have experience debugging issues and modifying configuration .json files. We cannot provide installation or configuration support on this site.

A tip o' the hat to user glibg10b for providing an initial draft of VS Code instructions across multiple articles.

For Linux users

VS Code should be downloaded using your distribution's package manager. The [VS Code instructions for linux](https://code.visualstudio.com/docs/setup/linux) (https://code.visualstudio.com/docs/setup/linux)[8] cover how to do this for various Linux distributions.

Once VS Code is installed, follow the [instructions on how to configure C++ for linux](https://code.visualstudio.com/docs/cpp/config-linux) (https://code.visualstudio.com/docs/cpp/config-linux)[9].

For Mac users

The [VS Code instructions for Mac (https://code.visualstudio.com/docs/setup/mac)](https://code.visualstudio.com/docs/setup/mac)[10] detail how to install and setup VS Code for macOS.

Once VS Code is installed, follow the [instructions on how to configure C++ for Mac (https://code.visualstudio.com/docs/cpp/config-clang-mac)](https://code.visualstudio.com/docs/cpp/config-clang-mac)[11].

For Windows users

The [VS Code instructions for Windows (https://code.visualstudio.com/docs/setup/windows)](https://code.visualstudio.com/docs/setup/windows)[12] detail how to install and setup VS Code for Windows.

Once VS Code is installed, follow the [instructions on how to configure C++ for Windows (https://code.visualstudio.com/docs/cpp/config-mingw)](https://code.visualstudio.com/docs/cpp/config-mingw)[13].

Other macOS IDEs

Other popular Mac choices include [Xcode (https://developer.apple.com/xcode/)](https://developer.apple.com/xcode/)[14] (if it is available to you) and the [Eclipse (https://www.eclipse.org/)](https://www.eclipse.org/)[15] code editor. Eclipse is not set up to use C++ by default, and you will need to install the optional C++ components.

Although Visual Studio for Mac has been released, it does not support C++, and Microsoft has announced they are sunsetting the product.

Other compilers or platforms

Q: Can I use a web-based compiler?

Yes, for some things. While your IDE is downloading (or if you're not sure you want to commit to installing one yet), you can continue this tutorial using a web-based compiler. We recommend one of the following:

- [TutorialsPoint](https://www.tutorialspoint.com)[16]
- [Wandbox](https://wandbox.org)[17] (can choose different versions of GCC or Clang)
- [Godbolt](https://godbolt.org)[18] (can see assembly)

Web-based compilers are fine for dabbling and simple exercises. However, they are generally quite limited in functionality -- many won't allow you to create multiple files or effectively debug your programs, and most don't support interactive input. You'll want to migrate to a full IDE when you can.

Q: Can I use a command-line compiler (e.g. g++ on Linux)?

Yes, but we don't recommend it for beginners. You'll need to find your own editor and look up how to use it elsewhere. Learning to use a command line debugger is not as easy as an integrated debugger, and will make debugging your programs more difficult.

Q: Can I use other code editors or IDEs, such as Eclipse, Sublime, or Notepad++?

Yes, but we don't recommend it for beginners. There are many great code editors and IDEs that can be configured to support a wide variety of languages, and allow you to mix and match plugins to customize your experience however you like. However, many of these editors and IDEs require additional configuration to compile C++ programs, and there's a lot that can go wrong during that process. For beginners, we recommend something that works out of the box, so you can spend more time learning to code and less time trying to figure out why your code editor isn't working properly with your compiler or debugger.

IDEs to avoid

You should avoid the following IDEs altogether because they do not support at least C++11, do not support C++ at all, or are no longer actively supported or maintained:

- Borland Turbo C++ -- does not support C++11
- Visual Studio for Mac -- does not support C++
- Dev C++ -- not actively supported

There is no good reason to use an outdated or unsupported compiler when lightweight, free alternatives that support modern C++ exist.

When things go wrong (a.k.a. when IDE stands for "I don't even...")

IDE installations seem to cause their fair share of problems. Installation might fail outright (or installation might work but the IDE will have problems when you try to use it due to a configuration issue). If you encounter such issues, try uninstalling the IDE (assuming it installed in the first place), reboot your machine, disable your antivirus or anti-malware temporarily, and try the installation again.

If you're still encountering issues at this point, you have two options. The easier option is to try a different IDE. The other option is to fix the problem. Unfortunately, the causes of installation and configuration errors are varied and specific to the IDE software itself, and we're unable to effectively advise on how to resolve such issues. In this case, we recommend copying the error message or problem you are having into your favorite search engine (such as Google or Duck Duck Go) and trying to find a forum post elsewhere from some poor soul who has inevitably encountered the same issue. Often there will be suggestions on things you can try to remedy the issue.

Moving on

Once your IDE is installed (which can be one of the hardest steps if things don't go as expected), or if you're temporarily proceeding with a web-based compiler, you are ready to write your first program!

Next lesson

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0.5   Introduction to the compiler, linker, and libraries

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B   U   URL   INLINE CODE   C++ CODE BLOCK   HELP!

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👤 Avatars from https://gravatar.com/[24] are connected to your provided email address.

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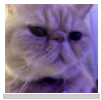**863 COMMENTS**   Most Voted ▼

Ali
  January 31, 2022 9:03 am

To the author of this website
I wish you all the nice and lovely things.

👍 22   ↪ Reply

Edward
  October 3, 2023 9:54 pm

Maybe adding a section for CLion will also be valuable (especially since students get all JetBrains IDEs for free)?

+ that it is one of easiest C++ IDE to use for Linux/ Mac users.

🖊 *Last edited 6 months ago by Edward*

👍 15   ↪ Reply

Kheder
  December 25, 2023 9:52 pm

Hi I'm 32 years old I have background (not-an-expert) in front-end and python programming language. I studied economics and accounting and have already decided to shift my career to become a developer. I reviewed the course for three days and found it very solid and here I'm getting under the hood of studying and learning C++ "because I want to do so". Thank you so much for this intensive content. and `Good luck everyone!!!`

👍 11   ↪ Reply

> **S.E.**
> 💬 Reply to Kheder [25]   January 23, 2024 6:36 am
>
> I hope you are still working on it!
>
> 👍 0   ↪ Reply

Lolo
  April 5, 2023 11:49 pm

im currently downloading visual studio and i can download multiple versions of Windows SDK 11 and 10 (10.020348.0, 10.0.19041.0, 10.0.18362.0) should i just go with the most recent?

👍 5   ➤ Reply

HiMom
🕐 February 11, 2024 11:11 am

I heard Neovim on Arch or Gentoo is pretty easy to get going

👍 4   ➤ Reply

> **kadenfrfx**
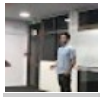> 💬 Reply to HiMom [26]   🕐 March 2, 2024 2:28 pm
>
> LMFAO
>
> 👍 1   ➤ Reply

DevTheTestser
🕐 March 15, 2023 1:05 am

Sup! I'm on a windows 11 machine and I had one look at the vs code instillations and said nop, not yet. SO ... my question is... should I download the windows 11 SDK, and should I still get the latest windows 10 SDK??

👍 4   ➤ Reply

Ochiruko
🕐 January 4, 2023 8:05 pm

Vim!!! Seriously though, the GCC/g++ docs are surprisingly beginner-friendly, and neovim is so simple in the most complicated ways. So terminal C++ it shall be (because downloading VS code to manjaro seems like a right pain in the arse).

👍 4   ➤ Reply

> **Michael**
> 💬 Reply to Ochiruko [27]   🕐 June 15, 2023 5:53 am
>
> I am about to set up nvim for c++ :)
>
> 👍 1   ➤ Reply

Confuze
🕐 November 12, 2022 9:27 am

It sucks that visual studio is not available for linux (at least not natively)

I found setting up visual studio code for c++ development to work best for me. It's actually very easy - all you have to do is install one extension. Here's a short guide: https://www.youtube.com/watch?v=BEJUdkPemYY

If you're using code-oss and can't find the extension, check this stackoverflow post: https://stackoverflow.com/questions/64463768/cant-find-certain-extensions-in-code-ossopen-source-variant-of-visual-studio-c

👍 **4**   ↪ Reply

Confuze
💬 Reply to Confuze ²⁸   🕐 November 12, 2022 12:18 pm

Also, for a more in-depth guide of c++ in visual studio code, here's some useful articles on that:
https://code.visualstudio.com/docs/cpp/config-linux
https://code.visualstudio.com/docs/languages/cpp

👍 0   ↪ Reply

Aravind
🕐 October 15, 2022 5:23 am

What SDK must I install if I am using win11. Windows 10 SDK or Windows 11 SDK?

👍 **4**   ↪ Reply

George P.
💬 Reply to Aravind ²⁹   🕐 January 17, 2023 8:01 am

There are some "behind the scenes" differences between the Win10 and Win11 SDK, though the differences for most programs aren't anything to worry about. Win11 created programs will run fine on Win10.

👍 0   ↪ Reply

Alex   Author
💬 Reply to Aravind ²⁹   🕐 October 16, 2022 9:22 am

Not sure it matters. I haven't tried the Win 11 SDK yet since I don't have Win 11 installed.

👍 1   ↪ Reply

Krishnakumar
💬 Reply to Alex ³⁰   🕐 August 16, 2023 11:56 am

You can use Win 11 SDK on Windows10 as well. In fact, that's the default selection in a fresh install on Windows 10 these days.

👍 0   ↪ Reply

Soulbest
🕐 September 28, 2022 8:28 am

I tried to install visual studio code on my computer, but every time that I try to create a new project it just shows the error "Object Reference not set to Instance of Object". I tried restarting, running as adminstrator, and completely cleaning my disk then reinstalling, but nothing seemed to prevent the error. What could cause that to occur?

👍 4   ↪ Reply

Cobalt
🕐 December 28, 2023 1:54 pm

I'm glad I switched to Windows. MacOS has been left in the dust.

👍 3   ↪ Reply

Krishnakumar
🕐 February 8, 2022 11:57 am

>In this case, we recommend copying the error message or problem you are having into a Google search

Better to re-word it as "into a web search engine"

👍 3   ↪ Reply

Hello
🕐 November 23, 2021 10:28 am

I use VSCode + G++ on MacOS.

👍 3   ↪ Reply

jay
🕐 August 14, 2023 11:46 am

Can I use CLion for this?

👍 **2**   ➜ Reply

Alex   Author
💬 Reply to jay [31]   🕐 August 17, 2023 5:26 pm

Sure.

👍 1   ➜ Reply

RetroSeven
🕐 October 7, 2022 10:56 am

You seem to gloss over macOS really quickly, you might want to add in a guide on how to install Xcode, possibly.

👍 **2**   ➜ Reply

Alex   Author
💬 Reply to RetroSeven [32]   🕐 October 8, 2022 10:55 am

I don't currently own a Mac, so I don't have a way to validate what I'd be writing. Been waiting like a year for Apple to release a Mac Mini pro.

👍 3   ➜ Reply

Krishnakumar
💬 Reply to Alex [33]   🕐 August 12, 2023 5:01 am

Mac mini M2 pro has been available, right?

👍 0   ➜ Reply

Alex   Author
💬 Reply to Krishnakumar [34]   🕐 August 17, 2023 1:11 pm

Yup! Still don't have one (yet) though. :(

👍 0   ➜ Reply

Krishnakumar
💬 Reply to Alex [35]   🕐 October 2, 2023 5:24 am

Planning to get one soon?

👍 0   ➜ Reply

Alex Author

Reply to Krishnakumar [36] ⏱ October 2, 2023 3:26 pm

It's currently not in budget for me. Hard to justify the expense when the vast majority of my work time goes to commenting and authoring, which I can do on just about any machine.

👍 0   ↪ Reply

RetroSeven

Reply to Alex [33] ⏱ October 10, 2022 12:32 pm

The current Mac minis with the M1 processor are fast enough for almost any programming work out there.

👍 1   ↪ Reply

Alex Author

Reply to RetroSeven [37] ⏱ October 10, 2022 9:43 pm

Agreed! But when I finally buy a mini, its primary purpose won't be programming (that will just be a side-benefit).

👍 2   ↪ Reply

Hoshyar Karimi
⏱ March 25, 2022 8:23 am

My setup on fedora:
sudo dnf install gcc-c++ gdb vim git

My compiler config:
g++ -std=c++17 -Wall -pedantic -g -O -Wformat=2

👍 2   ↪ Reply

Dennis
⏱ February 18, 2022 11:04 am

For Mac, you can set up C++ with proper extension, a good learning experience. just google

👍 2   ↪ Reply

KKW
⏱ November 25, 2021 12:42 am

turn out that Code::Block is complicated, so I use Visual Studio

👍 2   ↪ Reply

Abhay Dewan
💬 Reply to KKW [38] 🕐 November 29, 2021 8:09 pm

just installing visual studio, can we write programs on it??

🖉 Last edited 2 years ago by Abhay Dewan

👍 0   ↪ Reply

KKW
💬 Reply to Abhay Dewan [39] 🕐 November 29, 2021 9:50 pm

need to press the desktop c/cpp to write cpp programme

👍 0   ↪ Reply

KKW
🕐 November 24, 2021 8:30 pm

I use CODE::Blocks 20.03 mingw

👍 2   ↪ Reply

Hamish Poole
🕐 July 31, 2021 9:08 pm

Jetbrain's CLion is also an excellent C++ IDE, that's perfectly cross platform.

It's recently entered the scene and is not too popular because a lot of C++ developers are older, but I find it to be the absolute best in class IDE. Especially for new developers as it's preconfigured *extremely* well.

However, it does cost an arm and a leg (free for students at an education institution). Would not recommend it at all if you are $$$ constrained.

👍 2   ↪ Reply

Shiv Patel
💬 Reply to Hamish Poole [40] 🕐 August 11, 2021 5:11 am

Yeah, that's the problem. It's preconfigured so well, that it is hard to know the internal working of the project for a beginner.

👍 0 ↪ Reply

Links

1. https://www.learncpp.com/author/Alex/
2. https://monibe.com/humix/video/RLnAedyakX2
3. https://www.visualstudio.com/downloads/
4. https://visualstudio.microsoft.com/vs/express/
5. https://www.codeblocks.org/downloads/binaries/
6. https://winlibs.com/
7. http://wiki.codeblocks.org/index.php/Installing_a_supported_compiler
8. https://code.visualstudio.com/docs/setup/linux
9. https://code.visualstudio.com/docs/cpp/config-linux
10. https://code.visualstudio.com/docs/setup/mac
11. https://code.visualstudio.com/docs/cpp/config-clang-mac
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13. https://code.visualstudio.com/docs/cpp/config-mingw
14. https://developer.apple.com/xcode/
15. https://www.eclipse.org/
16. https://www.tutorialspoint.com/compile_cpp_online.php
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24. https://gravatar.com/
25. https://www.learncpp.com/cpp-tutorial/installing-an-integrated-development-environment-ide/#comment-591345
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29. https://www.learncpp.com/cpp-tutorial/installing-an-integrated-development-environment-ide/#comment-574023
30. https://www.learncpp.com/cpp-tutorial/installing-an-integrated-development-environment-ide/#comment-574046

31. https://www.learncpp.com/cpp-tutorial/installing-an-integrated-development-environment-ide/#comment-585586
32. https://www.learncpp.com/cpp-tutorial/installing-an-integrated-development-environment-ide/#comment-573854
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34. https://www.learncpp.com/cpp-tutorial/installing-an-integrated-development-environment-ide/#comment-585441
35. https://www.learncpp.com/cpp-tutorial/installing-an-integrated-development-environment-ide/#comment-585685
36. https://www.learncpp.com/cpp-tutorial/installing-an-integrated-development-environment-ide/#comment-588056
37. https://www.learncpp.com/cpp-tutorial/installing-an-integrated-development-environment-ide/#comment-573930
38. https://www.learncpp.com/cpp-tutorial/installing-an-integrated-development-environment-ide/#comment-562977
39. https://www.learncpp.com/cpp-tutorial/installing-an-integrated-development-environment-ide/#comment-563104
40. https://www.learncpp.com/cpp-tutorial/installing-an-integrated-development-environment-ide/#comment-556954